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ACHIEVEMENTS AND SHORTCOMINGS IN SOVIET MACHINE-TOOL BUILDING

AUTOMATIC TRANSFER MACHINE LINES IN MACHINE BUILDING -- Moscow, Mekhanizatsiya Trudoyemkikh and Tyazhelykh Rabot, May 53

In postwar years, machine-tool-building plants alone have designed and built more than 30 automatic-transfer-machine lines. Labor productivity on individual lines used in machine building has increased 38 times as compared with nonautomatic production. The introduction of automatic lines has decreased the need for machine tools by 50 percent, has increased the volume of production per square meter of production area three to five times, and has released 70-80 percent of the workers.

Half of the total quantity of machine tools produced at Soviet machine-tool-building plants are automatic or semiautomatic.

PROGRESS IN SOVIET MACHINE-TOOL BUILDING -- Stalinabad, Kommunist Tadzhikistana, 17 Nov 53

Soviet machine-tool builders are successfully meeting the directives of the 19th Party Congress. In 1952 alone, they perfected more than 140 new models of universal and specialized machine tools.

The machine-tool builders are developing equipment on which the smallest and largest parts used in modern machines can be machined. Special attention is being given to designing heavy machine tools and machine tools for the instrument-building industry. In recent years, a considerable quantity of new models of metal-cutting machine tools has been developed for machining large parts. For example, the Model 1682 lathe built by the Kramatorsk Machine-Tool-Building Plant can machine parts up to 3 meters in diameter, more than 30 meters long, and weighing up to 170 tons. The weight of the machine tool is 450 tons and the power of its electric motor is 260 kilowatts.

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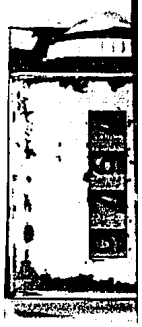


Heavy vertical lathes are now being produced at the Kolomna Machine-Tool-Building Plant. One of these machine tools will weigh about 1,700 tons.

A tracer milling machine weighing more than 100 tons and having a table more than 3 meters in diameter has been designed for milling complicated parts such as press molds for the vulcanization of tires for heavy trucks (e.g., 15-ton dump trucks).

Other types of large machine tools have been perfected and are being produced in large quantities. For example, parts weighing up to 20,000 kilograms can be bored on the new Model 2652 boring machine.

To install large parts on a machine tool requires powerful cranes. Certain parts, however, are so large and heavy (parts for ships, for example) that it is physically impossible to mount them on a machine tool. In this case, the machine tool must travel alongside the workpiece or be mounted directly on the workpiece. This gave origin to the self-propelled or portable machine tools. An example of this type of machine tool is the Model 2P58 self-propelled radial drilling machine. It is intended for drilling and reaming holes in large parts. It is mounted on a self-propelled cart which moves on rails at a speed of 10 meters per minute.

Portable machine tools which are mounted directly on the workpiece can perform various technological operations such as drilling, boring, planing, etc. These portable machine tools are not miniatures. For example, the Model LR48 machine tool and Model GF-165 planing and milling machine each weigh 6 tons. Other portable machine tools such as planing machines weigh several tens of tons.

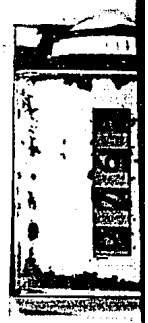
Modern high-speed turbines and generators require dynamic balancing of rapidly rotating parts whose weights reach several tens of tons. A number of machines have been built for balancing parts weighing up to 30 tons. These machines eliminate even the slightest unbalance. Parts weighing up to 75 tons are balanced on their own supports with the use of a portable instrument.

Other new machine tools produced in large quantities include machine tools for drilling tiny holes a fraction of a millimeter in diameter, jig boring machines that maintain a tolerance of hundredths and thousandths of a millimeter, grinding machines, and gear-grinding machines.

Templates, flat-shaped parts, etc., were usually made by hand. This required the highly skilled labor of gauge makers. A profile grinding machine, Model 395, has now been built for this purpose. Complex-shaped parts are machined on this model according to a blueprint. An image of the workpiece magnified 50 times is shown on an open screen 500 x 500 millimeters in size. The worker merely sees to it that the edge of the grinding wheel follows the line of the enlarged blueprint. Designers are now trying to fully automatize the work cycle of this machine tool by controlling it with photoelectric cells.

In the abrasives industry, work is now being done on the development of high-speed abrasive tools which will make it possible to grind at speeds up to 100 meters per second. To provide for this possibility, new grinding machines are being equipped with electric motors having increased power and speed.

A great deal of difficulty has been encountered in increasing the speed of internal grinding machines. To utilize cutting properties of modern abrasive tools in grinding small holes up to 10 millimeters in diameter, the grinding wheel must rotate at speeds of 100,000-150,000 rpm. It is impossible to solve this problem with existing designs of bearings.



Shteynberg, a Soviet scientist, suggested that air be used as a lubricant for high-speed spindles. Under high speeds, the spindle would virtually float and the air cushion would be sufficiently strong to hold the spindle suspended.

The output of high-production metal-cutting machine tools such as broaching machines is increasing considerably. Milling machines mill slots in screws at the rate of 15-18 items per minute, while a slot-broaching automatic now being produced puts out 250-400 items per minute.

All new models of universal lathes are now being equipped with copying attachments which will make it possible to produce complex-shaped parts in a semi-automatic cycle.

The controls of all heavy machine tools have been made automatic. -- A. Ye. Prokopovich, chief engineer, ENIMS (Experimental Scientific Research Institute of Metal-Cutting Machine Tools)

Petrozavodsk, Leninskoye Znamya, 11 Nov 53

The speed of complex types of equipment such as planing machines has been increased considerably. For example, instead of the earlier produced Model 2PS planing machines which has a maximum table-travel speed of 18-24 meters per minute, new planing machines have now been perfected with speeds up to 75 meters per minute. -- A. Ye. Prokopovich, chief engineer, ENIMS

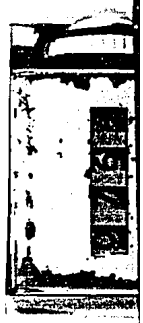
PRODUCTION OF HEAVY BORING MACHINES BOGS DOWN -- Moscow, Moskovskaya Pravda, 22 Nov 53

In 1953, the Moscow Machine-Tool Plant imeni Ordzhonikidze began to manufacture heavy universal horizontal boring machines [this information has been reported in 00-W-27438]. This equipment is intended for machining large frame parts. These machine tools are able to bore holes up to 1,200 millimeters in diameter, to mill flanges, to drill holes, and to cut threads to a high accuracy.

In giving the machine-tool plant this assignment, Glavstankoprom (Main Administration of Machine-Tool-Building Industry) knew that this order could be filled only with the extensive cooperation of a number of enterprises. Glavstankoprom and Glavtyazhgidropress [Main Administration of Heavy Hydraulic Presses?] were obligated to supply the Plant imeni Ordzhonikidze with a number of basic machine-tool parts such as beds, columns, slides, and base plates, because the plant did not have machine tools large enough to machine these parts.

The first two experimental machine tools were assembled at the plant in April and May. The all-inclusive tests on the machines showed them to be completely satisfactory and workers at the plant felt it would be possible to set up regular series production of this important product. Long before the assembly of the experimental machines was started, the plant did a great deal of work in preparation for the series output of these high-production machine tools.

A special flooring was built in one of the bays of the machine shop for assembling the boring machines. A strong foundation was made which would support a weight of several tens of tons. Two powerful cranes were installed in this area. The tool shop manufactured dozens of complex attachments and a full complement (hundreds of units) of special cutting tools. By orders of the Cooperation Division, a number of foundries manufactured hundreds of patterns necessary for the production of castings. A group of the most outstanding



fitters and assembly workers at the plant visited a heavy machine-tool-building plant to study the methods of assembling heavy machine tools. This preparatory work cost the plant several hundreds of thousands of rubles.

At the end of May and the beginning of June, regular production of boring machines was started. At this time, Glavstankoprom and Glavtyazhgidropress sent two schedules for the supply of basic parts. It appeared that all conditions were perfect for regular output of heavy machine tools. However, this did not happen.

According to the schedule, Glavtyazhgidropress should have supplied, between June and October, basic machine-tool parts for heavy-series machine tools in sufficient quantities for all machine tools specified for 1953. However, the schedule was carried out on paper only. In 5 months (June-October), the machine-tool plant has received 39 percent of the planned quantity of spindles, 25 percent of the beds, 32 percent of the columns with slides, and 16 percent of the foundation plates. Among this number, one bed received recently was defective and had to be returned to the supplying plant.

Messages reporting that the schedule for the supply of basic parts was breaking down and that the year's schedule for the assembly of heavy machine tools was in danger of collapsing were sent to Glavstankoprom, Glavtyazhgidropress, and Kostousov, Deputy Minister of Machine Building USSR. The messages received no attention.

The management of the machine-tool plant foresaw the breakdown of the former schedule for parts supply, but felt certain that the Kolomna Heavy-Machine-Tool Plant would send the machined basic parts according to the latter schedule. The Kolomna plant had more than enough time to manufacture them (the fulfillment of the latter schedule should have started in August).

However, the Kolomna machine-tool builders spent 4 months (July-October) working out the technological process for machining three basic parts. The machining process included planing work only. For 2 months, the Kolomna economists calculated the cost of machining beds, columns, and slides.

Finally, the technology was developed and the calculations were completed and sent to the Plant imeni Ordzhonikidze. It appeared that the manufacture and supply of parts could begin, but the Kolomna management refused to begin producing parts without a contract. When asked to expedite the drawing up of the contract or to begin work without it, they wrote in reply, "Confirm our calculation for the cost of machining." They wrote this, knowing very well that even a man with little economic training could not agree with their calculations, which were obviously padded. The following figures are given to support this statement.

According to an estimated calculation, the planned norm cost of one machine bed with slides is 52,227 rubles (including all types of expenditures and the cost of casting). The Kolomna plant expected to receive more than 22,000 rubles for planing work alone, excluding the cost of casting and other expenditures, which comprise more than two thirds of the machining cost. According to norms, the planing of a column costs 1,395 rubles; the Kolomna plant asked 8,265 rubles. The cost of machining slides, according to norms, is 1,568 rubles; according to the Kolomna price, it would be 7,242 rubles. The Kolomna plant increased the cost of machining one bed to 12,343 rubles above the norm.

According to the Kolomna plant calculation, 689 hours are required for machining one bed. This is incorrect and the calculation itself exposes its untruth: it shows that only 383 norm hours are required for machining the bed;

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306 norm hours are planned for an auxiliary worker. Even if an auxiliary worker is actually needed in machining a bed, why should the Kolomna economists add 732 percent in overhead expenditures to the machining cost.

The Kolomna plant is now 2 months behind schedule in machining basic parts for heavy machine tools.

It is time to put an end to this red tape. Heavy boring machines must be produced by the planned dates and according to the cost established by an estimated calculation. -- V. Kochetkov

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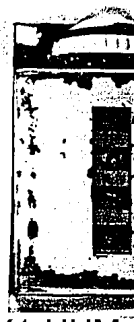

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